Undernutrition among Bedouin Arab children: a follow-up of the Bedouin Infant Feeding Study[1–3]

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ABSTRACT After 10 y of urban settlement, 680 Bedouin Arab children, who had had anthropometric assessment from birth (1981–1982) through early childhood, were reassessed in 1991–1992 to compare the rates of stunting in early and later childhood as well as to describe the factors influencing current height-for-age. Stunting had dropped from 32.7% at 18 mo to 7.2% at 10 y in the 1981 birth cohort and dropped from 17.5% at 9 mo to 8.2% at 9 y in the 1982 birth cohort. Based on a multiple-linear-regression analysis, height in early childhood and maternal height were statistically significantly and positively associated with current mean height-for-age in both cohorts. In the 1982 cohort socioeconomic status in early childhood was positively and current family size was negatively and significantly associated with current mean height-for-age. Thus, conditions that were present in early childhood had the largest influence on current height. In 1992, 10% and 6% of the infant siblings of the 1981 and 1982 cohorts, respectively, were stunted compared with 17% and 1% of the siblings aged 1–2 y of the respective cohorts. Therefore, the high rates of early childhood stunting in 1981–1982 appeared to be a birth cohort–specific phenomenon. *Am J Clin Nutr* 1995;61;495–500

KEY WORDS Growth, nutritional status, social change

Introduction

The prevalence of linear growth retardation increases with age during infancy and early childhood in many developing countries (1–7). This increase in linear growth retardation or stunting has been associated with impoverishment, morbidity, and inappropriate weaning practices leading to inadequate dietary intake (1, 3). Few studies in developing countries, however, have followed cohorts through childhood to determine whether early stunting continues in later life (8, 9).

The Bedouin Infant Feeding Study (BIFS), conducted from 1981 to 1984, was designed as a longitudinal cohort study of two birth cohorts (born 1981 and 1982) among Negev Bedouin Arab women of Israel. The major objectives were to examine the interrelationship between infant feeding practices, growth, and morbidity during transition from a seminomadic to a sedentary lifestyle (10). Among the 1981 birth cohort of Bedouin Arab infants, the incidence of stunting rose from 12% at 6 mo to 19% at 12 mo and then to 32% at 18 mo (3). The cutoff for stunting was < 2 SDs from the median height-for-age of the Centers for Disease Control-World Health Organization reference population (11). The BIFS rates were based on a follow-up of healthy newborns with normal, not low, birth weight, thereby underestimating the rate of stunting in the total birth cohort.

In 1990–1992, the Bedouin Arab Follow-up Study (BAFS) of two subcohorts from the BIFS was conducted to estimate the rate of stunting at 9–10 y of age and to examine the factors associated with the current rate of stunting. The BIFS and BAFS were part of a larger collaborative effort between the Division of Epidemiology, Statistics, and Prevention Research of the National Institute of Child Health and Human Development, Bethesda, MD, and the Division of Health in the Community of the Faculty of Health Science at Ben Gurion University of the Negev.

The objectives of this paper are to *1*) compare the current prevalence rate of stunting among two subcohorts of Bedouin Arab children with their rates in early childhood; *2*) examine the association between factors (dietary, maternal height, family size, hospitalized morbidity) in early and later childhood and current height-for-age, taking into account the dynamics of changes in socioeconomic status (SES) and in the child's physical setting; and *3*) to compare the prevalence rates of stunting among siblings who were < 2 y of age with the rates of stunting in the index children aged < 2 y in 1981–1982. The objective of this step was to determine whether stunting in the original cohort was a birth cohort–specific phenomenon.

Subjects and methods

In the original BIFS, one subcohort [born in 1981 (n = 348)] was followed from 6 through 18 mo of life and the second

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subcohort [born in 1982 ($n = 376$)] was followed from birth through 9 mo of life. In the BAFS, both subcohorts ($n = 724$) were measured once in prepubescence (ie, 9–10 y of age).

The BAFS was designed as a school-based study, including a brief interview and anthropometric assessment of the index children, followed by a maternal home interview of a subsample. Among the 724 children, 693 were interviewed at school (or at home for school drop-outs). Among the remainder, 10 died, six families had moved from the Negev, and 15 could not be located. Another nine children were missing measurements of height in the original study and four were physically disabled, thereby reducing the total sample by 44 children (6%). The analysis was based on the remaining 680 children.

Because of limited resources, the home interview focused on a subsample ($n = 309$) of the school interview children, who were randomly selected within three sampling strata determined by the child's current and earlier height-for-age. Specifically, stratum 1 ($n = 146$) consisted of all those who were currently and previously stunted, of whom slightly $> 90\%$ were selected; stratum 2 ($n = 57$) consisted of those who were previously stunted and currently of low height-for-age (ie between -1 SD and the median height-for-age), of whom 66% were selected; and stratum 3 ($n = 477$) consisted of the remainder, of whom 30% were sampled. During the visit for the home interview, siblings aged < 2 y ($n = 92$) were measured. The home interview data were therefore based on 309 maternal interviews and 92 sibling measurements.

The study protocol and informed consent were reviewed by the Institutional Review Board at the Ben Gurion University in accordance with the Helsinki Declaration.

Data collection

Female Arab university students or high school graduates who were from either the local Bedouin community or Arab villages in northern Israel, were trained by the anthropologist (GLH) who had > 20 y of research experience among the Bedouin Arabs of the Negev. Each interview tool was pretested among a random sample ($n = 30$) of the original cohort, who were not part of the BAFS. The school interviews included anthropometric assessment and directions to the place of residence for subsequent home interviews. During the home interview the mother was asked about her reproductive history, the index child's health and diet, the family's socioeconomic status, household structure, and living environment. Finally, anthropometric assessment of any sibling aged < 2 y of the same biological mother as the index child was collected.

Anthropometric assessment and morbidity data collection

Interviewers were trained to measure heights and weights by an anthropometrist and/or by team members (LZ and KA) who were trained by the anthropometrist. Periodic retraining sessions and standardization of equipment were conducted by the supervisor (KA). The equipment for anthropometric assessment included the SECA Integra electronic digital LED scale (battery-operated; SECA Corporation, Columbia, MD) for measurement of weight to the nearest 0.1 kg, and the Shorr infant/child/adult portable board for measurement of height to the nearest 0.1 cm (Shorr Productions, Silver Spring, MD).

The anthropometric data were examined for interviewer bias and bias because of attrition. Mean weights and heights were compared by interviewer by using the analysis of covariance model, after adjustment for interview date (as a proxy for season), child's age, sex, and cohort. This analysis did not reveal any statistically significant difference in measurements between interviewers nor any difference in early childhood measurements among those missing from and those included in the follow-up.

All measurements were entered into the anthropometric program of the Centers for Disease Control and Prevention/World Health Organization (CDC/WHO) to calculate age (in mo)- and sex-specific Z scores for each child (11). The cutoff for identifying moderate to severe malnutrition was < -2 SDs from the median value for the age and sex group of the CDC/WHO reference population (11, 12). Thus, when Z scores were used in the analysis, the data were adjusted for age and sex.

Bedouin Arab children were hospitalized at the Soroka Medical Center of the Ben Gurion University, which is the only hospital in the Negev. Medical students at Ben Gurion University were trained to abstract morbidity data from pediatric hospital records and microbiology laboratory reports for the BIFS (3). All data were coded according to the ninth revision of the *International Classification of Diseases* (13). Because the BIFS study subjects were healthy at birth and only a few had repeat hospitalizations during the first 18 mo of life, the age and reason for the first hospitalization were used in the calculation of the morbidity variable in early childhood (3).

During the BAFS mothers were asked whether the index child had ever been hospitalized and the age and reason for the hospitalization. Twenty-nine percent had ever been hospitalized, with 74% of the hospitalizations occurring during the first 18 mo, which duplicated the morbidity in early childhood data. Therefore, the remaining 26% of the ever hospitalized were classified by age and reason in the calculation of the morbidity variable in later childhood.

Development of the scales of SES

Since the BIFS, the Negev Bedouin Arab population has experienced continued social change and urban settlement. In 1981–1984, only two towns were well-established and two others were in the initial stages of development. By 1991 three additional towns were being settled. Consequently, many families in the original study had experienced a dramatic change in their living conditions over the decade. For example, there had been a dramatic shift in type of housing. The proportion of families living in houses with access to running water had increased from $\approx 25\%$ in 1981 to 75% in 1991. Conversely, the proportion living in huts declined from 50% to 20% and those living in tents declined from 13% to 5% over the same 10 y.

In the BIFS, a culture-specific scale of SES was based on ethnographically observed geographic clustering of SES variables by housing type (3, 14). All variables, which were statistically significantly associated with housing type in the univariate analysis, were subjected to discriminant function analysis, with type of housing as the dependent variable (either tent, hut, or house). Four variables—paternal education (0–16 y), floor type (tile, cement, or earth), cooking apparatus (electric or gas oven, primus stove, or open fire), and water source (tap, outside water pipe, cistern, or well)—significantly distinguished the three housing types (3, 14). Individual scores on these variables formed the original SES scale, which was trichotomized into equal units of high, medium, and low for data analysis.

A similar approach was taken in the BAFS to enable the use of both scales in the same multiple variable models. In the BAFS, three of the original four variables distinguished housing type: cooking apparatus, floor type, and water source. Individual scores were also trichotomized into equal units for data analysis.

Maternal interview data in the BAFS included information about reproductive status and household structure. Specifically, data on gravidity, parity, vital status of each child, and the age of the youngest child as well as the number and age of the children of any of the father's other wives were collected. For purposes of data analysis the variable current family size was based on the total number of children of the index mother and of other wives residing in the household.

Dietary assessment

In the original BIFS, infant feeding data were collected prospectively during each maternal interview at 6, 12, and 18 mo of age for the 1981 cohort and at birth, 2, and 9 mo of age for the 1982 cohort. Infant feeding practices were categorized into five groups according to the reported age-specific data. The five groups had infants who were *1*) bottle and solid fed; *2*) breast-fed and solid fed; *3*) breast-fed and bottle-fed; *4*) breast-fed, bottle-fed, and solid fed; and *5*) exclusively breast-fed (3).

A culture-specific food-frequency questionnaire of 49 food items was administered during the maternal home interview in BAFS. The mother was asked whether the index child "often, seldom, or never" ate each food without regard for a specific time interval, because pilot-study subjects revealed a culture-specific pattern of responses that disregarded unit of time.

The dietary data were analyzed to reduce the number of food items and identify potential dietary patterns. The data analysis included Spearman rank correlation coefficients followed by principal components cluster analysis, which produced four clusters: *1*) cheap, new, staple foods; *2*) traditional foods; *3*) snack foods; and *4*) affluent modern foods. The dietary data were summarized into four cluster scores by calculating the proportion of times that a specific food item was consumed "often" within each cluster. The four cluster scores were examined for bias from interviewers, season of interview, family size, and child's sex by using the analysis of covariance model. Two variables, interviewer and season of the interview, had statistically significant effects on the mean food cluster scores. Finally, a total food score was calculated based on the responses (3 = often, 2 = seldom, and 1 = never) to the items in each cluster. This score was regressed on interviewer and season of the interview to get a residual score for use in the multiple variable analysis.

Data analysis

In the first phase of the analysis the distribution of the current height-for-age in *Z* scores was examined. Computed chi-square tests were used to compare the current prevalence rates of stunting with the rates in early childhood. Kendall's tau correlation was used to examine the following factors in relation to current mean height-for-age: *1*) infant feeding practices, hospitalized morbidity, and SES in early childhood (3); and *2*) SES, food cluster scores, hospitalized morbidity, and family size in later childhood. Maternal height was not collected in the BIFS and was therefore analyzed in relation to height-for-age in early and later childhood.

In the second phase all factors that were significantly associated with current height-for-age at $P \leq 0.10$ were treated continuously and entered into multiple-linear-regression models. A similar approach was taken in the earlier report (3). All statistical analyses were run by using *SAS* procedures (SAS Institute Inc, Cary, NC). Because the distribution of SES in early childhood differed by subcohort in the BIFS, the BAFS models were computed separately by subcohort. The final models had variables that remained after a stepwise backward elimination process with $P \leq 0.05$. Moreover, the final models were weighted to the original sample by the use of *SUDAAN*, a statistical package that uses the stratification and sampling weights (ie, the inverse of the sampling rates) in the estimation of the coefficients and SEs (15).

A similar strategy for statistical analysis of the sibling data was followed. Sibling data were age-stratified into those who were aged 1–2 y and those who were ≤ 1 y at the time of the home interview in accord with the cross-sectional design of the follow-up. The sibling data were restricted to those with normal birth weights analogous to the BIFS and were also weighted to take into account the sampling weights of the home interviews by using *SUDAAN* (15).

Results

Index child analysis

The percentage of children who were stunted in 1991–1992 was significantly less than that a decade earlier (**Figure 1,** A and B). Specifically, 7.2% of the 1981 birth subcohort was stunted at follow-up compared with 32.7% in early childhood, and 8.2% of the 1982 birth subcohort was stunted at follow-up compared with 17.5% in early childhood.

The factors that were significantly associated with current height-for-age included earlier height-for-age, maternal height, SES in early childhood and currently, and family size (**Table 1**). A child's earlier height-for-age was positively related to his or her current height-for-age, indicating a tendency for children to maintain their ranking over time. Maternal height was positively correlated with current height-for-age. SES in early childhood and current SES were positively related to current height-for-age. Specifically, children of the higher-SES families—in early childhood and now—were taller than the children in the lower-SES families. Current family size was negatively associated with current height-for-age. That is, children in larger families, had lower height-for-age in contrast with children in households with smaller family sizes. All other variables, morbidity in early and later childhood, infant feeding practices in early childhood, and the four food cluster scores in later childhood were not statistically significantly associated with the current mean height-for-age (data not shown).

Based on the cohort-specific multiple-linear-regression analyses, maternal height and the index child's height-for-age in early childhood were positively associated with current height-for-age in the 1981 subcohort (**Table 2**). Thirty-three percent of the variation in height-for-age was explained by these two variables. For the 1982 subcohort, SES in early childhood,

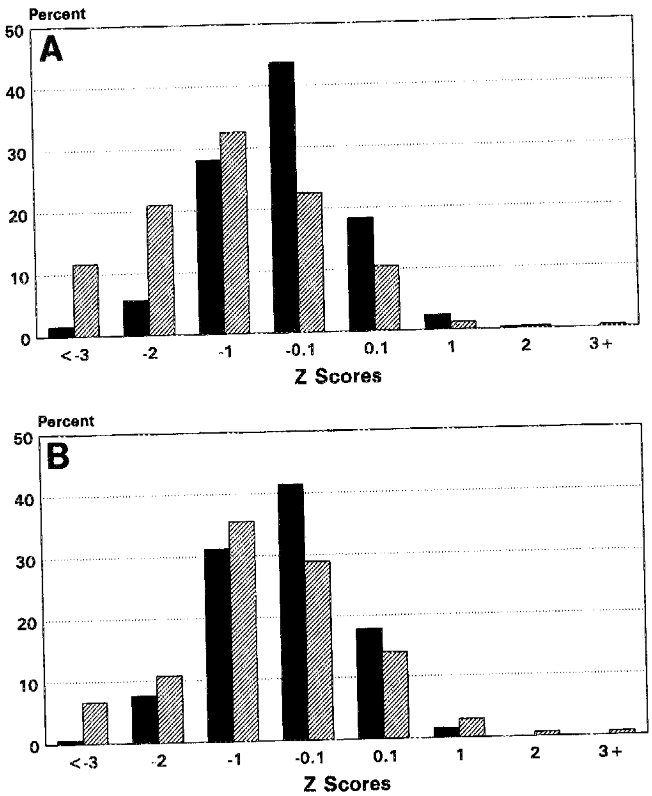

FIGURE 1. A: Current (■) and earlier (▨) (18 mo) height-for-age in Z scores (HAZ) for the 1981 birth cohort (n = 334). B: Current (■) and earlier (▨) (9 mo) height-for-age in Z scores (HAZ) for the 1982 birth cohort (n = 343).

maternal height, and height-for-age in early childhood were positively associated with current height-for-age, whereas family size was negatively associated with current height-for-age (Table 2). Thirty-four percent of the variation in height-for-age in the 1982 subcohort was explained by these four variables.

Sibling analysis

Among siblings of the 1981 subcohort aged 1–2 y, 17% were stunted in contrast with 44% of the index children when they were 18 mo of age (**Table 3**). Among siblings of the 1982

TABLE 1
Kendall's Tau correlation between earlier height-for-age, maternal height, socioeconomic status (SES), family size, and current height-for-age for The Bedouin Arab Follow-up Study

Variable	Correlation with current height-for-age	P
Height-for-age in early childhood	0.34[1]	< 0.001
Maternal height	0.35	0.001
SES in early childhood	0.27	0.001
Current SES	0.14	0.01
Family size	−0.09	0.10

[1] The sample size for the correlation between earlier and current height-for-age is based on the total cohort of 680, whereas the sample size for the remaining correlations is based on the home interview subsample of 309. All data are weighted by using the sampling weights.

TABLE 2
Factors associated with current mean height-for-age in the 1981 and 1982 subcohorts: multiple linear-regression models of the Bedouin Arab Follow-up Study[1]

Variable	1981 subcohort (n = 143) β	1981 subcohort (n = 143) P	1982 subcohort (n = 138) β	1982 subcohort (n = 138) P
Maternal height	0.045	0.0001	0.0329	0.002
Height-for-age in early childhood	0.250	0.0001	0.262	0.0001
SES in early childhood	0.047	0.34	0.135	0.04
Family size	−0.024	0.13	−0.031	0.03

[1] All data are weighted by using the sampling weights. Sample size is reduced by missing socioeconomic status (SES) data in early childhood (n = 28).

subcohort, 11% were stunted in contrast with 14% among the index children when they were 9 mo of age. Two factors, age at last measurement and sampling variability, contributed to these cohort differences in the age-specific prevalence rates of stunting. For the 1982 subcohort the last measurement in early childhood was taken at 9 mo of age, which provides a lower estimate of the rate of stunting at ages 1–2 y in the 1982 subcohort, given the rise in the rates of stunting from 19% at 12 mo to 32% at 18 mo in the 1981 subcohort (3). In addition, the rates of stunting were based on 18–31 sibling pairs in each cohort because of the sampling scheme for the household interviews. These small numbers created sampling variability and large SEs around each prevalence rate, with the rates of stunting in the total original subcohorts located within one SE of the sampling weight-adjusted rates appearing in the tables.

Among the siblings of the 1981 subcohort aged ≤ 1 y, 10% were stunted in contrast with 33% of the index children when they were 12 mo of age (**Table 4**). Among siblings of the 1982 subcohort, 6% were stunted in contrast with 18% of the index children when they were 9 mo of age. Therefore, the prevalence rates of stunting among siblings aged ≤ 1 y were consistently one-third of the rate in the BIFS subcohorts. Finally, current and earlier height-for-age of the index children and maternal height were positively correlated with the height-for-age of all the siblings (**Table 5**).

TABLE 3
Percentage and SE within each height-for-age in Z score category for the index child and sibling by subcohort[1]

Subcohort	Height-for-age < −2	−2 to −1.01	−1 to −0.01	0+
1981	%	%	%	%
Index child	44 ± 13	4 ± 4	42 ± 14	11 ± 10
Sibling	17 ± 11	31 ± 13	26 ± 11	26 ± 11
1982				
Index child	14 ± 5	30 ± 9	42 ± 10	14 ± 8
Sibling	11 ± 5	33 ± 9	38 ± 10	17 ± 8

[1] The index children were 18 mo of age in the 1981 subcohort (n = 18) and 9 mo of age in the 1982 subcohort (n = 31); their siblings were aged 1–2 y at the time of the measurement (n = 18 siblings in 1981; n = 31 siblings in 1982). $\bar{x}$ ± SE.

TABLE 4
Percentage within each height-for-age Z score category for the index child and sibling by subcohort[1]

Subcohort	Height-for-age < −2	−2 to −1.01	−1 to −0.01	0+
1981	%	%	%	%
Index child	33 ± 9	38 ± 12	14 ± 9	14 ± 9
Sibling	10 ± 7	18 ± 7	31 ± 11	42 ± 12
1982				
Index child	18 ± 8	27 ± 11	37 ± 13	17 ± 11
Sibling	6 ± 4	36 ± 13	36 ± 13	23 ± 11

[1] The index children were 12 mo of age in the 1981 subcohort (n = 23) and 9 mo of age in the 1982 subcohort (n = 18); their siblings were aged < 1 y at the time of the measurement (n = 23 siblings in 1981; n = 18 siblings in 1982). $\bar{x}$ ± SE.

Discussion

From 1981 to 1992, the rates of stunting among two subcohorts of Bedouin Arab children dramatically dropped from early childhood to age 9–10 y in later childhood. This finding differs from previous longitudinal studies of linear growth retardation in rural Guatemala and Mexico, where stunting persisted over time (8, 16). Thus, during a 10-y period of social change and urban settlement, Bedouin Arab children of the Negev had experienced some degree of catch-up growth as evidenced by the decline in stunting in the original cohort.

The prevalence rates of stunting among the BAFS siblings, who were < 2 y of age in 1991–1992, were much lower than the rates of stunting of index children in early childhood in 1981–1982. Specifically, the prevalence rates of stunting among siblings aged ≤ 1 y in both subcohorts were one-third the rates of the original BIFS subcohorts at comparable ages. The current prevalence rate of stunting among the siblings aged 1–2 y was dramatically lower than the rate in the 1981 subcohort at a comparable age. In contrast, these age-specific rates of stunting among the siblings and index children in the 1982 subcohort were similar. Several factors, such as sampling variability and age at last measurement, limit the interpretation of the 1982 subcohort data in particular. In general then, the current rates of stunting in early childhood (among siblings) were lower than the earlier BIFS rates, thereby indicating that the original high rates of stunting in early childhood were probably a birth cohort–specific phenomenon.

TABLE 5
Kendall's Tau correlation coefficients between current height-for-age of the sibling and (current and earlier) height-for-age of the index child as well as maternal height for The Bedouin Arab Follow-up Study[1]

Variable	Correlation with current height-for-age of sibling	P
Current height-for-age of index child	0.20	0.04
Earlier height-for-age of index child	0.18	0.08
Maternal height	0.26	0.01

[1] Weighted for the sampling weights by using the number of siblings of normal birth weight (n = 92).

Although the prevalence rates of stunting in the index children have declined over time, the peak has shifted 1 SD closer to the median of the CDC/WHO reference population, with a slight increase in the percentage of children to the right of the median. Such a shift therefore demonstrated more of a movement away from the cutoff for stunting and into the SD of marginally low height-for-age rather than a continuous shift to the right for the total distribution. This finding agrees with that of an earlier longitudinal study (16).

Among the factors influencing current height-for-age, maternal height and prior height-for-age of the index child were positively related to the variation around the mean in the final multiple variable models of both subcohorts. Parental height has consistently been related to growth in children (1, 4, 6–7, 17). Likewise, a child's earlier height-for-age was reported to influence the current height-for-age (6–8).

Two other factors, SES and family size, were significantly associated with the variation of current height-for-age in the 1982 but not the 1981 subcohort. The 1982 subcohort had a higher mean SES score and larger SD in early childhood than the 1981 subcohort, after adjustment for place of residence, which covaried with SES and growth. In the subcohort-specific models in later childhood, therefore, SES in early childhood had a stronger effect on the height-for-age in later childhood in the 1982 subcohort than in the 1981 subcohort.

What were the conditions related to a higher mean SES score in early childhood? More of the 1982 subcohort than the 1981 subcohort lived in houses or huts during the original BIFS (14). Improved hygienic conditions from running water and opportunities for use of appliances such as refrigerators and stoves among house and hut dwellers in the original BIFS might have contributed to reduction of disease and improvements in nutrition as described by Martorell et al (9). These improvements could not be observed by comparing the rates of stunting in early childhood in the two birth subcohorts, however the mean height-for-age in early childhood in the 1982 subcohort was −1.16 compared with a mean of −1.46 in the 1981 subcohort. Perhaps, therefore, the lower mean in the 1982 vs 1981 subcohort is an indication of improved conditions. The SES effect was reported in a Mexican cohort study of 7–9-y old children (7, 16). In a cross-sectional study of Turkana children aged 4–9 y, these nomadic children were significantly shorter than their settled peers who were formerly nomadic, thereby providing evidence for the relationship of height and urban settlement (18).

Family size was significantly and negatively related to the mean height-for-age in the 1982 model. Family size was an indicator of family life cycle. Thirty-eight percent of the Bedouin Arab families had a younger wife and her family ($\bar{x}$ = 6 ± 4 children) living with the older first wife and her children ($\bar{x}$ = 8 ± 3). Thus, the inverse relation of family size and height-for-age might be indicative of: limited economic resources in polygamous households in which one husband/father has to feed two wives and their children, household structure (eg, status of co-wife); allocation of food to family members (eg, age or birth order effects); and the increased opportunity for disease to be brought into and spread through the household (8, 16). The inverse relation of family size to height-for-age, after adjustment for SES, has been documented previously (16).

Neither dietary practices in early or later childhood were associated with the index child's current mean height-for-age. The four food clusters of dietary practices in later childhood were collapsed into one variable—a food score—which was not associated with current height-for-age, maternal height, or family size. The use of a nonquantitative food-frequency questionnaire to assess the annual intake of specific foods limited the ability to examine the effect of the index child's dietary habits on the current mean height-for-age. Prior research documented an association between nutrient intake and the latter two variables (6, 16).

The association between current SES and current height-for-age did not remain after adjustment for maternal height and height-for-age in early childhood, yet there has been a dramatic increase in the construction of houses over time. The large majority of the population currently lives in houses with running water, electricity, and modern appliances such as gas stoves and refrigerators. Moreover, calculation of the change in SES over time, based on SES scores in the BIFS and in the BAFS, was not associated with current height-for-age. Therefore, it appears that the factors associated with current height-for-age were largely present in early childhood—prior height-for-age, SES in early childhood in the 1982 subcohort, and maternal height. A similar phenomenon was described by Tanner (7).

The long-term effects of this apparent catch-up growth are largely unknown. Data on skeletal age, appearance of secondary sexual characteristics, and menarche were not collected in this study. Earlier data on age at menarche among Bedouin Arabs of the Negev or other areas have not been collected. Therefore, catch-up growth might either hasten menarche and maturation and reduce the growth period without benefit to adult stature and body mass or might delay maturation and improve adult stature (9). Only a follow-up of this or other cohorts through adolescence can assess the long-term effects.

In summary, this is the first reported longitudinal cohort study of stunting in a population undergoing rapid urban settlement. There was a dramatic decline in the prevalence rates of stunting from early to late childhood for subcohorts (1981 and 1982) of Bedouin Arabs of the Negev. Height measured in early childhood and maternal height were positively associated with current height-for-age in both subcohorts. In the 1982 subcohort, socioeconomic status in early childhood was positively related, whereas family size was negatively related to current height-for-age. Thus, factors or conditions that were present in early childhood had the largest influence on current height-for-age. Moreover, the current prevalence rates of stunting in early childhood among siblings of the index children were lower than the rates in early childhood of the original subcohorts, thereby providing some evidence that the very high rates in the original study appeared to be a birth cohort–specific phenomenon.

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